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AUTHOR Searls, Evelyn F.
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ABSTRACT

After expanding on the definition of advance organizers as proposed by David Ausubel, this paper offers possible reasons for the lack of strong empirical support for the use of the strategy. It then cites examples of the successful use of advance organizers with learners from nursery school through college and in a variety of disciplines. The paper offers guidelines for classroom teachers who wish to use advance organizers, and describes the structured overview format for an advance organizer, which appears to be practical in terms of teacher time and effort. The paper argues that the structured overview format provides an opportunity for teacher-student discussion that can clarify the state of the student's knowledge and that the organizer is an appropriate strategy for bridging the gap between what the learners know and what they need to know. (Author/FL)

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Using Advance Organizers in the Classroom

Evelyn F. Searls

University of South Florida

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Running Head: Using Advance Organizers

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Using Advance Organizers in the Classroom

It has been 20 years since David Ausubel (1960) published his first account of the use of advance organizers. In his latest major publication (Ausubel, Novak, & Hanesian, 1978), he finds it hard to understand the criticism of his colleagues and the lack of empirical support for the advantages of using such a strategy to promote meaningful verbal learning. Even taking into consideration the 10-year lag estimated to exist between the formulation of educational theory and basic research and applications of that theory and research in classrooms, it does seem that the use of advance organizers is long overdue. Given the rapid rise and fall that is characteristic of many educational practices, one wonders why the concept of advance organizers is still viable. And it is viable, judging from the number of recently published journal articles, research reports, and educational texts which deal with the concept. After a brief explication of the centricity of advance organizers to Ausubel's theory of meaningful verbal learning, this paper will explore some possible reasons for the lack of empirical support and present guidelines and practical suggestions for the construction and use of advance organizers in classrooms at various age levels.

According to Ausubel et al. (1978):

> Meaningful reception learning involves the acquisition of new meanings. It requires both a meaningful learning set and the presentation of potentially meaningful material to the learner.

> The latter condition, in turn, presupposes (1) that the learning material itself can be nonarbitrarily (plausibly, sensibly, and nonrandomly) and substantively (nonverbatimly) related to any appropriate cognitive structure (possesses "logical" meaning) and (2) that the particular learner's cognitive structure contains relevant anchoring idea(s) to which the new materials can be related. (p. 38)

Of the two conditions set forth, Ausubel and his colleagues assert that the second, the existing structure of the learner's knowledge at the time of learning, is the more important. This is succinctly stated as follows: "If we had to reduce all of educational psychology to just one principle, we would say this: The most important single factor influencing learning is what the learner already knows. Ascertain this and teach him accordingly" (p. 163).

Once the teacher has ascertained the state of the learner's knowledge (a difficult task to which Ausubel devotes little space), the principle teaching strategy recommended for the deliberate manipulation of the learner's cognitive structure so as to enhance meaningful verbal learning is the use of "appropriate relevant and inclusive introductory materials (organizers)" (p. 170). These organizers are to be used in advance of the learning experience in order to establish a meaningful learning set and to "bridge the gap between what the learner <u>already knows</u> and what he <u>needs to know</u> before he can meaningfully learn the task at hand" (pp. 171-172). Contrary to summaries and overviews, advance organizers should be at a higher level of abstraction, generality, and inclusiveness

than the new material to be learned. This will provide the "ideational scaffolding" or superordinate ideas under which the new subordinate ideas may be subsumed.

Ausubel's theory is inherently logical. It is well established, both from empirical studies and our own knowledge of the world, that the acquisition and retention of large bodies of subject matter knowledge are impossible without the ability to abstract and classify. Lawton and Wanska (1977) stated that "it is impossible to disprove the existence of the single crucial cognitive variable in the theory--that is, stable, clear, hierarchically organized subject matter knowledge" (p. 239). It then follows that a teaching strategy (e.g., advance organizers) designed to facilitate the hierarchical structuring of knowledge should promote learning. Yet, the empirical research has failed, for the most part, to confirm this.

Barnes and Clawson (1975) reviewed 32 studies, including those by Ausubel and colleagues, and found only 12 that showed significant results in favor of the use of advance organizers. Baker (1977) analysed 52 studies since the early work of Ausubel; a majority of them were non-supportive. A number of investigators have proposed possible explanations. The one most frequently encountered is the lack of an operational definition of an advance organizer, one which would provide criteria and examples so that a panel of impartial judges could identify an advance organizer (Barnes & Clawson, 1975). Ausubel has been criticized for vagueness and ambiguity in terminology (Rickards, 1977) and for not providing specific examples. In defense, Ausubel has replied that he devoted

23 pages of his 1968 publication to the nature and definition of advance organizers, including a discussion of how to construct one on a specific topic. This reviewer, as well as others (Hartley & Davis, 1976; Thelen, 1976; Vacca, 1978), has searched in vain for the "how to" discussion. General suggestions can be found, but specific examples are lacking in Ausubel's text.

However, if one reexamines Ausubel's two criteria for the presentation of potentially meaningful material, and if one remembers that the second criterion, the existing structure of the learner's cognitive structure, is the more important, it then becomes obvious that any given advance organizer can only be illustrated in terms of the cognitive gap it is designed to bridge. One may describe the building of bridges in general, or the building of specific types of bridges, but the specifications for a particular bridge will depend on the width of the chasm to be spanned and many other factors. Or, if the metaphor of an advance organizer as ideational scaffolding is carried a bit farther, one does not erect scaffolding for a particular building without a blueprint of both the foundation and the completed structure. A perusal of the research on advance organizers reveals an appalling lack of attention to (or, at any rate, lack of reporting of) the existing cognitive structures of the learners in the experimental and control groups. Statements abound such as, "It was believed that . . ." and "It was assumed that . . ." such-and-such a cognitive state existed in the subjects. Information from pretests or other pertinent data which would indicate the learners' existing cognitive structures were not given in the majority of the reports. Thus, several researchers (Jones, 1979; Lawton & Wanska, 1977; Mayer,

1979a; Meyer, 1979) have hypothesized that perhaps advance organizers failed to result in significantly improved learning either because the learners were able to provide their own subsumers or because the organizers were not sufficient to bridge the gap.

The second major reason proposed for the lack of empirical support has been the failure of most studies to analyze results in terms of what kind of learning took place (Christie & Schumacher, 1976; Mayer, 1979a). Most studies measured overall retention. Ausubel's subsumption theory predicts that the retention of conceptual ideas will be enhanced by the use of advance organizers but the retention of technical details will not. Measures of overall amount retained will not be sensitive to the selective effects. In his review of 50 published advance organizer studies, Mayer (1979b) found none which used a dependent measure that analyzed retention into individual idea units. In a recent study, Mayer and Bromage (1980) demonstrated qualitative differences in learning rather than a simple overall difference.

A third reason for the lack of empirical support for the use of advance organizers has recently been investigated by Luiten, Ames, and Ackerson (1980). Instead of classifying advance organizer studies into those finding statistically significant and nonsignificant results as Barnes and Clawson (1975) did, Luiten et al. examined 135 published and unpublished studies of the facilitative effect of advance organizers on learning and retention, using the meta-analysis technique proposed by Glass (1978). This technique enables researchers to quantify, standardize, and average treatment effects across studies of a similar type. All effect sizes, regardless of magnitude, are thus included. Using this technique, Luiten et al. found

that the average participant receiving the advance organizer treatment performed better than 58 percent of control group individuals, indicating an overall small facilitative effect on learning and retention.

While classroom teachers wait for researchers to design better studies to confirm the advantages of using a teaching strategy that seems logically feasible, what can they do? It is suggested that they proceed as if the advantages had been demonstrated. If this seems heresy to some, remember that the world is, and always has been, round even though this fact was not "proven" until the 15th century. Harste (1978) has deplored the unfortunate belief among educators "that things are not true until psychological research proves them" (p. 21). While a "wait and see" attitude may be prudent if large amounts of time, effort, and money are involved, or if possible psychological damage to students could ensue, that does not seem to apply to the use of advance organizers.

At what age level or stage of cognitive development may advance organizers be used? Although the early studies by Ausubel and many subsequent studies were conducted using college students as subjects, advance organizers have been used successfully with nursery age children (Lawton & Ershler, Note 1), preschoolers and kindergarteners (Lawton & Fowell, 1978; Swadener & Lawton, 1977), elementary students (Lawton, 1977; Lawton & Wanska, 1979), and secondary students (Hall, 1977; Jones, 1979). (References are illustrative rather than exhaustive.) On the other hand, few investigators have considered Piaget's stages of cognitive development in relation to the use of advance organizers. Lawton and his colleagues at the University of Wisconsin have been the principle researchers. They have presented evidence of logical operations by 6-year-olds, indicating

that the teaching of high order concepts accelerated their progression from the preoperational to the concrete operational stage of cognitive development (Lawton, 1977). A study currently being conducted by Nielsen (Note 2) at the University of South Florida is investigating the possible facilitation by advance organizers of the transition of seventh graders from concrete to formal stages.

With what kinds of subject matter may advance organizers be used? The answer is any body of subject matter which has a systematic overall structure. This would include almost all of the school curriculum; highly structured disciplines such as science, math, and social studies are fertile fields for the use of advance organizers. In the review by Barnes and Clawson (1975) 30 of the 32 studies had been conducted in these three disciplines. The interpretation of literature might be considered a less fertile field. However, the recent work of schema theorists (Anderson, 1977; Kintsch, 1977; Rumelhart & Ortony, 1977) suggests that advance organizers ("story schema") may profitably be used in this field also.

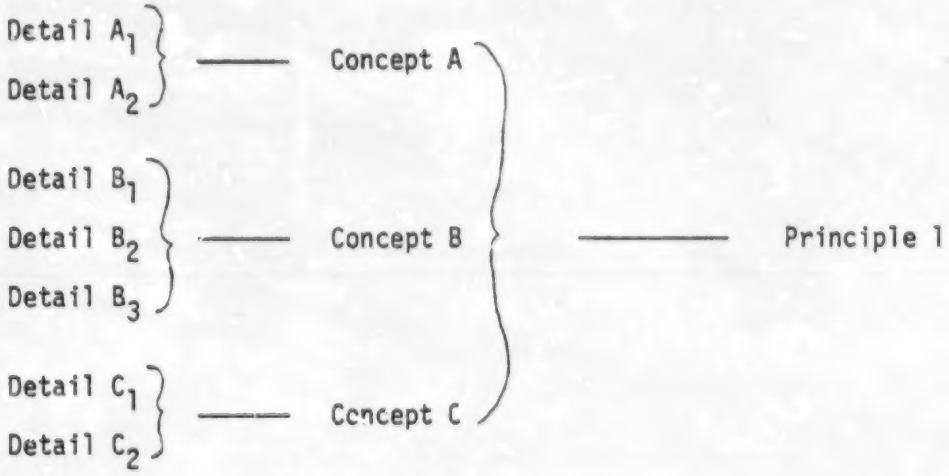
How are classroom teachers going to construct advance organizers, lacking an operational definition and few concrete examples from research? Fortunately, the literature has provided some guidelines. According to Ausubel et al. (1978), advance organizers should have the following characteristics: (a) They should be more inclusive, abstract, and general than the learning material they precede in order to provide a framework for the stable incorporation and retention of the more detailed material to be learned. (b) They must take into account the relevant existing ideas that students have about the topic. This means that the level of abstractness and generality can only be determined in relation to the capabilities

of the learners; e.g., the concept, "dog," may be abstract for a 2-year-oid. (c) They must demonstrate the relationship between the ideas learners already have and the new ideas to be learned. (d) If the learners have few relevant existing ideas, the advance organizer needs to be more expository in nature; i.e., teachers will need to provide more informational framework, being careful, however, to use terminology familiar to the learners. (e) If the new material can be related to a cognitive framework already possessed by the learners, the advance organizer should be comparative in nature. It is then used "to integrate new ideas with basically similar concepts in cognitive structure and to increase discriminability between new and existing ideas that are essentially different but confusably similar' (Ausubel et al., 1978, p. 172).

Ausubel has not been specific as to the format for an advance organizer. In his studies with college undergraduates he used prose passages (approximately 200 to 500 words) which students read before reading the new material. Other investigators have used pictures (Farr, 1975), titles (Farr, 1975; Meyer, Brandt, & Bluth, 1978), single sentences (Christie & Schumacher, 1976; Rickards, 1976) graphic displays (Hall, 1977), slide-verbal presentations (Jones, 1977; Lawton & Wanska, 1979), and structured overviews (Earle, 1969; Estes, Mills, & Barron, 1969), as well as prose passages.

The structured overview would seem to hold the most promise at the present for classroom teachers who want to begin using a form of advance organizer. The use of the adjective, "structured," distinguishes this type of overview from those in general use; the latter generally are presented at the same level of abstraction and inclusiveness as the learning material which they introduce and emphasize the main ideas of that material.

As developed by Barron (1969) the structured overview purports to satisfy the criteria established by Ausubel for an advance organizer. Barron defined structure as the hierarchical ordering of principles (or generalizations), concepts, and detail. To prepare an advance organizer for a specific unit, teachers must first determine the major understandings, or concepts, they wish the students to understand. Then they must determine which concepts must be "chained" to secure an understanding of the principles (generalizations) involved in the unit of study. Finally, they need to identify the pertinent details which, when classed together, form the major concept. The end result might resemble the following (Barron, 1969, p. 31):



After teachers have identified the logical structure of the material to be learned (Ausubel's first criterion), they depict this structure in the form of a diagram or outline in terminology familiar to the students in such a way that the relationships between terms and the relative importance of terms are highlighted. This visual display is then presented

to the students, accompanied by a verbal discussion. During the discussion teachers can, through questioning, discover relevant ideas students have about the topic, and then relate the structured overview to their background of knowledge, thus meeting Ausubel's second criterion. The discussion has the advantage of information-sharing by students, as well as permitting teachers to make adjustments in level of abstractness and in terminology.

Estes et al. have defined a structured overview as a "visual and verbal representation of the key vocabulary of a learning task in relation to more inclusive or subsuming vocabulary concepts that have previously been learned by the student" (1969, p. 41). They found no significant difference between the use of an advance organizer in the form of a 500-word prose passage (read silently by students) and a structured overview consisting of a series of vocabulary terms organized to depict the topic of the science unit (fungi) within a broad taxonomy. Thus, they concluded that the structured overview seemed to facilitate learning and retention as well as the prose advance organizer. Furthermore, they suggested that classroom teachers might find the use of the structured overview preferable because it allows teachers greater certainty that they are relating the new information to the old information already possessed by students. When students must read the advance organizer silently, there is no way for the teacher to be sure as to its appropriateness in terms of the students' level of ability and backgrounds of experience. The discussion involved in the use of a structured overview does allow teachers to determine its appropriateness and make modifications as necessary.

Further support for a visual/verbal advance organizer, such as the structured overview, may be found in the recent analysis of 135 advance organizer studies by Luiten et al. (1980). Their comparison of written and aural modes of advance organizer presentation revealed that the aural mode was more effective.

Earle and Barron (1973, p. 84) used the following directions to help teachers construct and implement a structured overview:

1. Analyze the vocabulary of the learning task and list all words that you feel are representative of the major concepts that you want the students to understand.

2. Arrange the list of words until you have a diagram which shows the interrelationships among the concepts particular to the learning task.

3. Add to the diagram vocabulary concepts which you believe are already understood by the students in order to depict relationships between the learning task and the discipline as a whole.

4. Evaluate the overview. Have you depicted major relationships clearly? Can the overview be simplified and still effectively communicate the relationships you consider to be most important?

5. When you introduce the learning task, display the diagram to the students and explain briefly why you arranged the words as you did. Encourage the students to supply as much information as possible.

6. During the course of the learning task, relate the new information to the structured overview as it seems appropriate,

Earle (1976) reported that teachers who used these directions found that the process helped them clarify their content objectives and helped

students to see relationships between present, past, and future topics of study. Figure 1 presents a structured overview prepared by a ninth grade math teacher for Earle's study.

Insert Figure 1 about here

Earle and Barron (1973) successfully used the structured overview in Figure 2 to introduce students to a course in biology. Directions to students were as follows:

> This course is a difficult one in the sense that there are a great number of new ideas and terms to learn. I'll be using diagrams similar to this one to help you see which ideas are most important and how these ideas fit together. Don't feel that you must memorize these diagrams. Rather, try to relate new and more specific information from our labs, large group lectures, and reading assignments to these diagrams. This course, as you can see, deals with biology--the study of life. What can you tell from this diagram? (p. 90)

Insert Figure 2 about here

In this reviewer's opinion, the best single source for classroom teachers who wish to understand and use advance organizers is probably Eggen, Kauchak, and Harder's (1979) recent text, Strategies for Teachers: Information Processing in the Classroom. Chapter 7, "The Ausubel Model,"

describes the model in easily understandable terms, explores ways the model can be used in different subject areas and at different age levels, and gives profuse illustrations. Eggen et al. demonstrate the use of a prose advance organizer in three forms (definition, analogy, and generalization) accompanied by a structured overview in the teaching of world geography. (Definition and generalization exemplify Ausubel's expository organizer; analogy resembles his comparative organizer.)

To introduce the course of study, Mr. Anderson, a geography teacher, used the following definition: "Geography is a correlative science, pulling together and combining the many facets of earth and man into complete pictures or mosaics to be viewed in their entirety as total systems" (Eggen et al., 1979, p. 259). He then put the following structured overview on the board.

Geography

Elements of Physical Environment	Man and the Physical Environment	Different World Regions--Ability to Support Man

He used this outline to introduce the course of study and, through discussion, to relate the inclusive broad topics to his students' knowledge about geography.

The first lesson of the first unit was on landforms. The definition advance organizer was: "Landforms are land surfaces that have characteristic shapes and composition" (Eggen et al., 1979, p. 260). The term "landforms" was added to the structured overview under "Elements of

Physical Environment." Mr. Anderson used concrete objects and discussion (illustrated in the text) to develop the concepts of different kinds of landforms: mountains, plateaus, and hills. These terms were then added to the structured overview under "Landforms."

The second lesson was on another element of the physical environment, waterways. This term was added to the structured overview opposite "Landforms." Because Mr. Anderson knew that his students were familiar with the circulatory system of the body, he placed the following comparative advance organizer on the overhead screen for the class to read.

> A river system is as important to the other elements of the physical environment as the circulatory system is to the human body. It also has some of the same features. A main river, such as the Mississippi River, provides the "life blood" - water - for plants and animals as well as the agriculture industry and the hydroelectric industry, just as the aorta as a major artery carries blood to the parts of the body. Besides water, it also carries many sources of food for plants and animals. In this respect, rivers resemble the arteries of our body which carry nutrients to the different parts of the body. They are like veins in that they carry many waste products back to the sea. However, a river system differs from the circulatory system in that the food supply and wastes are all carried in one channel. Another similarity is that, like capillaries, streams feed into the river. Therefore, like the circulatory system, the river system functions as the carrier of both sources of energy and as a carrier of waste products.

> Just as man can misuse the circulatory system, man can also misuse a river system. When too much waste is carried by the river, it starts to clog up, just as a vein or artery can get clogged. Factories along rivers, soil erosion caused by poor farming methods or poor forestry practices are major causes of clogging. Also, chemicals, fertilizers and insecticides used by farmers have caused the vegetation along rivers to change. As with the circulatory system, this damage sometimes cannot be repaired, and the repairs, if possible at all, are very time consuming. (Eggen et al., 1979, p. 263)

He again used discussion to elicit other comparisons of the two systems. The structured overview was added to as indicated in Figure 3.

Insert Figure 3 about here

When introducing the second unit, "Man and the Physical Environment," Mr. Anderson used the structured overview to review what had been studied in the first unit. He then used the following advance organizer in the form of a generalization: "The more technology and knowledge man acquires, the less limiting are the influences of nature on man's life" (Eggen et al., 1979, p. 264). The three major ways that man interacts with the environment were added to the structured overview under "Man and the Physical Environment." The first one, "Agriculture," was discussed and again the structured overview was expanded as indicated in Figure 3.

During all discussions Mr. Anderson made frequent references to the advance organizers and the structured overview so that students could verbalize the relationship of the facts they were learning to the overall structure of the subject.

It is clear from Eggen et al.'s illustrations that teachers must know the structure of their subject areas thoroughly, must know what information their students already possess, and must be able to guide students in assimilating the new knowledge. This is surely what good teaching consists of. The combined use of a prose advance organizer and a structured overview would seem to facilitate both the teachers' and learners' tasks.

Up to this point nothing has been said in this paper regarding the relationship of advance organizers to the use of textbooks. The textbook continues to be the principle source of information in most classrooms. Ausubel et al. (1978) contend that most texts are not written so as to enhance the learning and retention of meaningful verbal material.

> The more typical practice is to segregate topically homogeneous materials into separate chapters and subchapters, and to order the arrangement of topics and subtopics (and the materials within each) solely on the basis of topical relatedness without regard to their relative level of abstraction, generality, and inclusiveness. (pp. 190-191)

Instead, texts should have a hierarchical series of organizers. The initial ones should furnish anchorage at a global level. Each unit of material should be preceded by an organizer and the material within each unit should be presented in descending order of inclusiveness. Although

topical segregation may be necessary, the relationship of each topic to the global subsumers should be emphasized. Ausubel et al. attempted to write their text in conformance with these guidelines, at the same time cautioning in a note (1978, p. 171) that the introductory statements at the beginning of each chapter were not true advance organizers for two reasons. First, the topics in each chapter were too broad and heterogeneous to be subsumed under a single advance organizer. Second, the preparation of a true advance organizer requires "specific knowledge of potentially relevant anchoring concepts in the learner's cognitive structure" (p. 171). The second reason is valid. The heart of Ausubel's model rests on bridging the gap between what the learner knows and what he needs to know. Only teachers can ascertain what their students already know before they begin to read a text.

The first reason, the breadth and heterogeneity of topics presented in the chapters, does not seem to be valid. Ausubel et al. could have provided a better example of text organization along the lines they proposed. Two more recent texts, one in the field of educational psychology (Hamachek, 1979) and one in the field of reading education (Friedman & Rowls, 1980), have better exemplified the use of advance organizers and the hierarchical structuring of their subject matter.

Psychology in Teaching, Learning, and Growth (Hamachek, 1979) is divided into five separate but interrelated parts, each preceded by an organizer which establishes global subsumers as well as relating that part to the other divisions. Each chapter is preceded by a listing of the important generalizations contained within the chapter. Chapter

headings and subheadings are extensive and follow exactly the chapter outline which precedes each chapter.

Teaching Reading & Thinking Skills (Friedman & Rowls, 1980) is divided into six parts, the first of which introduces the integrating theme--prediction. This theme is related to the teaching of reading throughout the book. Advance organizers for each chapter are in the form of (a) statements of purpose, (b) a brief discussion relating the new information to be presented to information that readers are assumed to have, (c) a list of key terms that may be unfamiliar, (d) desired learning outcomes, and (e) hierarchical charts (structured overviews).

Obviously, the use of a text which includes advance organizers would make the teacher's task easier. Teachers would still have the responsibility for ascertaining what their students already know. Once this has been done, they could adapt, restate, explain, or make other necessary adjustments to be sure that the advance organizers will really function as such for the students with whom they are working.

In summary, Ausubel has proposed a theory of meaningful verbal learning which is inherently logical. Central to his theory is the use of advance organizers, material to be presented at the beginning of a unit of study at a higher level of abstractness, generality, and inclusiveness than the new material to be learned. These organizers should provide the bridge between what the learners already know and what they need to know in order to assimilate the new material. Although research has not provided overwhelming evidence that advance organizers enhance meaningful verbal learning, the dictum from the natural sciences should

be kept in mind: Absence of evidence does not necessarily imply evidence of absence. Advance organizers have been used successfully with learners from nursery school to college and with a variety of disciplines, particularly the social sciences, science, and math. There are guidelines in the literature for teachers who wish to use advance organizers. In terms of teacher time and effort involved, the structured overview format seems the easiest to implement. It has the additional advantage of providing an opportunity for teacher-student discussion which can clarify the state of the students' knowledge and the appropriateness of the organizer. A text which contains advance organizers can be an asset to teachers, but they will still need to adapt the material to the needs of their students. In the final analysis, any advance organizer can be defined only in terms of the existing cognitive structures of the learners for whom it is intended.

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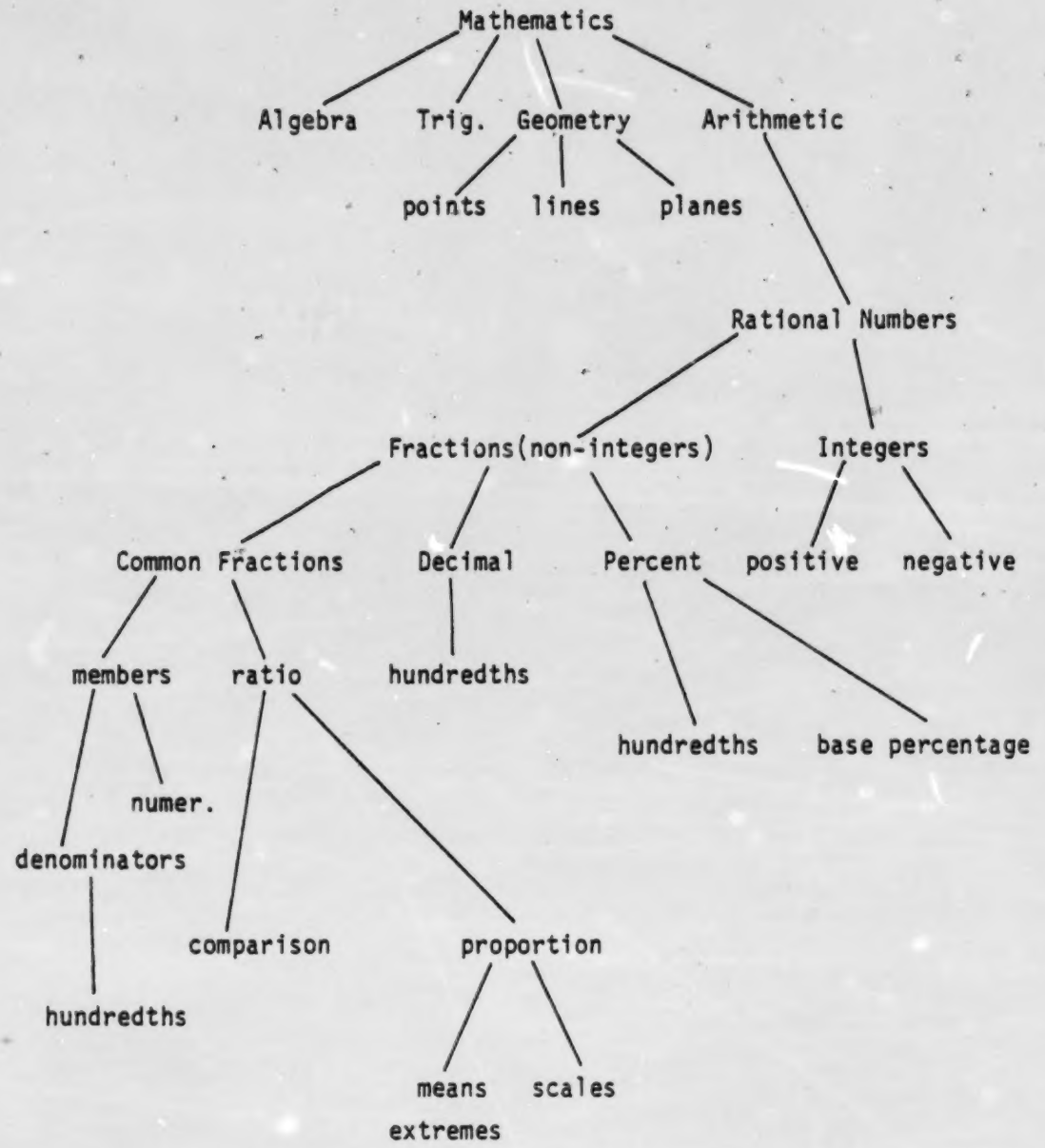
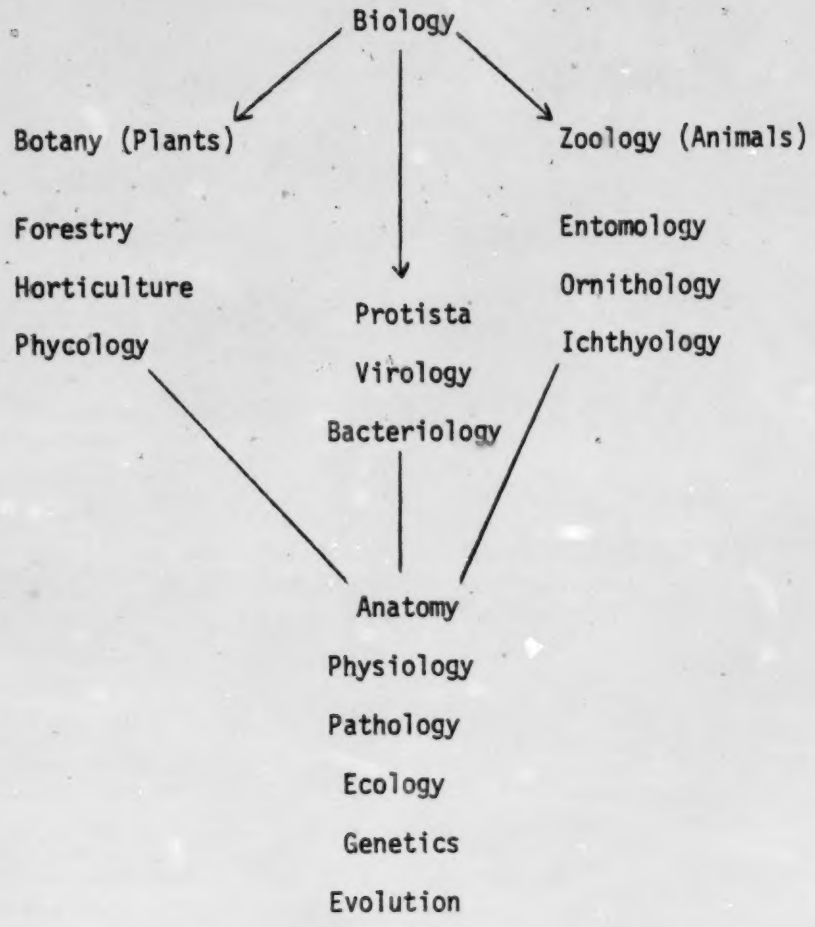
Figure Captions

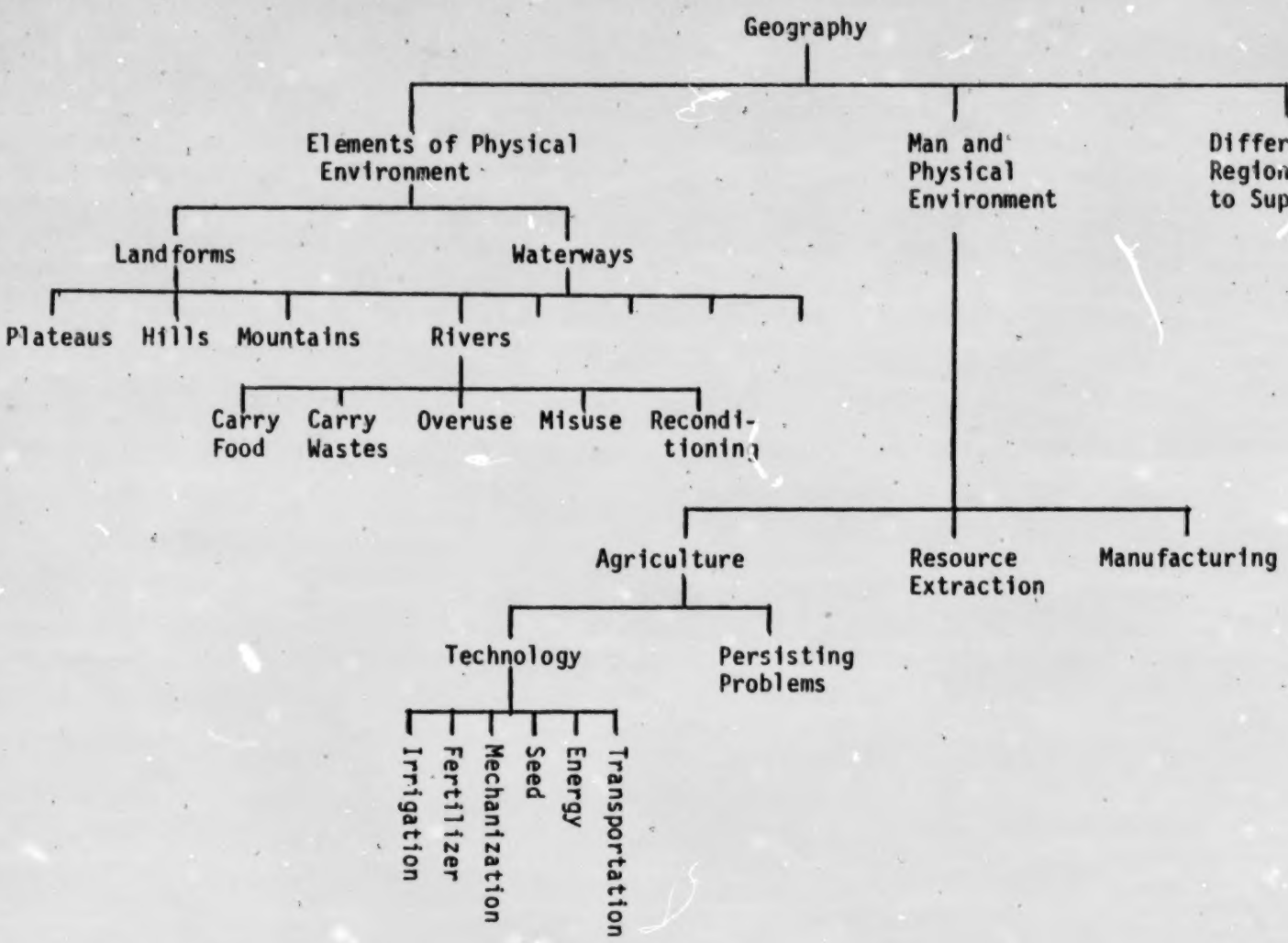
Figure 1. Structured overview for ninth grade math. (Earle, 1969, p. 54)

Figure 2. Structured overview for introductory biology course. (Earle & Barron, 1973, p. 90)

Figure 3. Structured overview for a world geography course. (Eggen, Kauchak, & Harder, 1979, pp. 259-265)


Mathematics
Algebra
Trig.
Geometry
Arithmetic
points
lines
planes
Rational Numbers
Fractions(non-integers)
Integers
Common Fractions
Decimal
Percent
positive
negative
members
ratio
hundredths
hundredths
base percentage
numer.
denominators
comparison
proportion
hundredths
means
scales
extremes


Biology
Botany (Plants)
Forestry
Horticulture
Phycology
Protista
Virology
Bacteriology
Zoology (Animals)
Entomology
Ornithology
Ichthyology
Anatomy
Physiology
Pathology
Ecology
Genetics
Evolution


Geography
Elements of Physical Environment
Man and Physical Environment
Different World Regions-Ability to Support Man
Landforms
Waterways
Plateaus
Hills
Mountains
Rivers
Carry Food
Carry Wastes
Overuse
Misuse
Recondi-tioning
Agriculture
Resource Extraction
Manufacturing
Technology
Persisting Problems
Irrigation
Fertilizer
Mechanization
Seed
Energy
Transportation